

# **Summary of potential impacts of MPA packages 1, 2R, 3R, P, and “Commission Preferred” on commercial and recreational fisheries in the Central Coast Study Region**

**Draft version, 28 August 2006**

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## **Introduction**

The following data sets were used in the analysis of relative effects of the MPA packages on commercial and recreational fisheries that are conducted in the waters in the Central Coast Study Region:

- For the commercial fishery, we used data layers characterizing the spatial extent and relative stated importance of fishing grounds of 19 commercial fisheries in the Central Coast Study Area (SA) previously transmitted by Ecotrust to the Marine Life Protection Act Initiative (MLPAI) under the terms of contract agreement No. 2005-0067.<sup>1</sup> This information was collected during interviews in the summer of 2005, using a stratified, representative sample of 100+ fishermen whose individual responses about the relative importance of ocean areas for each fishery were standardized using a 100-point scale and normalized to the reported fishing grounds for each fishery;
- For the recreational fishery, we used recreational private and rental boat fishing effort data from the California Recreational Fisheries Survey (CRFS) 2004 and made available to Ecotrust by the California Department of Fish and Game (CDFG). This information consists of observed number of angler trips per microblock, and is grouped for trips for particular species. Of those, we analyzed the trips for rockfish and salmon in order to characterize two of the most important recreational fisheries in the study area. Similar survey data for Commercial Passenger Fishing Vessels (CPFV) were not available in time for this analysis.

## **Overview of fisheries considered in the analysis**

The commercial fisheries considered in this analysis are of varying importance in terms of ex vessel revenues. Table 1 below lists the species or groups considered and their share of Central Coast Study Region commercial fishing revenues, using the 6-year average of nominal ex vessel revenues between 1999 and 2004. In most cases, the same fisheries account for substantially different proportions of statewide landings. For example, Dungeness crab accounts for only 1.66% of CCRS landings (by ex vessel revenue), but 17.33% of state totals. Interestingly, private and rental boat fishing for both rockfish and salmon account for double the percentage of all trips in the Central Coast Study Region (22% and 50%, respectively) than trips for the same species statewide (10% and 23%). Corresponding data for the charter boat fleet were not available at the time of this analysis. In general, however, CPFV trips consist of several times the number of anglers as private and rental boat trips.

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<sup>1</sup> Scholz et al., 2006, “Commercial fishing grounds and their relative importance off the Central Coast of California”, Report to the California Marine Life Protection Act Initiative, Contract No. 2005-0067, April 2006, 39pp.

**Table 1 – Summary of fisheries considered in the analysis**

<b>Commercial</b>			<b>Recreational</b>		
<i>Species or group</i>	<i>% of CCSR fisheries revenues, 6-year average (1999-2004)</i>	<i>% of CA statewide fisheries revenues, 6-year average (1999-2004)</i>	<i>Species or group</i>	<i>% of CCSR observed private and rental boat recreational angler trips [No. of total trips: 84,000]</i>	<i>% of CA statewide [No. of total trips: 663,000]</i>
Anchovy	2.17%	0.65%	n/a	n/a	n/a
Cabazon	2.73%	0.59%	n/a	n/a	n/a
Dungeness crab	1.66%	17.33%	n/a	n/a	n/a
Halibut	1.95%	2.24%	n/a	n/a	n/a
Kelp Greenling	0.25%	0.08%	n/a	n/a	n/a
Lingcod	0.33%	0.17%	n/a	n/a	n/a
Mackerel	0.13%	1.10%	n/a	n/a	n/a
Deep Nearshore Rockfish	4.83%	1.24%	Rockfish	22%	10%
Rockfish Nearshore					
Rockfish Shelf					
Rockfish Slope					
Rock Crab	0.78%	1.03%	n/a	n/a	n/a
Salmon	12.57%	8.08%	Salmon	50%	23%
Sardine	7.19%	3.95%	n/a	n/a	n/a
Sablefish	5.53%	3.40%	n/a	n/a	n/a
White Seabass	0.47%	0.47%	n/a	n/a	n/a
Surfperch	0.20%	0.09%	n/a	n/a	n/a
Spot Prawn	7.38%	2.25%	n/a	n/a	n/a
Squid	24.49%	18.81%	n/a	n/a	n/a

### Approach

The five MPA network proposals under review (Packages, 1, 2R, 3R, P, and “Commission Preferred”) vary according to their spatial extent and the commercial and recreational fishing uses they affect. Specifically, they vary by the number and types of fisheries permitted within the boundaries of particular MPAs within a network. Furthermore, study area (SA) fisheries themselves vary in spatial extent and frequently overlap. Most of them are conducted in fishing grounds that extend beyond the state waters of the CCSR, and we report the effects both in terms of total fishing grounds (G) and those that fall within the study area. Since any one MPA may have different effects on different uses, and different uses may be affected differently by all MPAs, it is therefore necessary to consider single MPAs and single fishery uses independently. Similarly, since current fishery closures such as the Rockfish Closure Area affect all proposals equally, they have no differential effect.

We conducted an overlay of each MPA with each potential use. MPAs were grouped according to level of protection, using the same levels of protection as elsewhere in the Science Advisory Team (SAT) evaluations and as described in the January 10<sup>th</sup> draft of the “Rationale for SAT categorization of MPAs by relative levels of protection” (ProtectionLevels\_draft\_10Jan06.doc), but uses were considered individually. In other words, for each MPA and protection level within each package, we assessed the fishery uses that would be affected.

We quantified the first order maximum effects of proposed MPAs on both commercial and recreational fishing, analyzing the percent of total fishing grounds for any one fishery included in a given MPA. This is a first-order, “worst case” analysis that is silent on the eventual behavioral response. In other words, the analysis assumed that all fishing in an area affected by an MPA would be lost completely, when in reality it is more likely that effort would shift to areas outside the MPA. There are, however, currently no data available to support an analysis of such an adaptive response.

We compiled results in a series of spreadsheets transmitted to the MPLAI and Science Advisory Team, summarizing the effects of the various MPA packages on commercial and recreational fisheries both in terms of the area affected and the relative value lost. For the purposes of this analysis, “value” was measured not in terms of Dollars, but using two proxies: 1) an index of relative, stated importance derived from interviews with fishermen in the case of the commercial fisheries, and 2) number of observed private and rental boat trips to a microblock in the case of the recreational fisheries.

For this first order evaluation, we assumed that all fishing in an area intersected by MPAs and fishing grounds would be affected. Where an MPA straddled a reporting block in the recreational data, we apportioned the number of trips associated with that block proportional to the area overlap. In the case of the commercial fisheries, data are at a sufficient spatial resolution to allow for direct summation. It is important to note that the analysis specifically does not constitute an economic impact analysis, nor account for behavioral responses such as shifts in fishing effort to other areas.

The percent of area and value affected was calculated based on the grounds identified within the Central Coast region, not for the whole state.

### **Assessing MPA packages**

The percent change in area and value for each of the commercial fisheries were determined by the intersection of each MPA package and the fishing grounds specific to that use. Each MPA within a package was classified by whether it would affect the fishery or not. If a fishery was affected by an MPA, the area and value were summarized and then divided by the total area and value for the entire fishing grounds (G), as derived from interviews with fishermen, and the total study area (SA).

The total percent of the area and value affected for both the total fishing grounds and the grounds inside the study area was then summarized for all MPAs that affected each fishery per package. Packages vary considerably in their effects, both between and across fisheries, as the following table illustrates for commercial fisheries. The Commission Preferred Package is based on the August 15<sup>th</sup> California DFG Commission decision. Package P is based on the May 25<sup>th</sup> Blue Ribbon Task Force decision. Packages 2R and 3R are based on the March

15<sup>th</sup> Blue Ribbon Task Force decision. No revisions were made to the February 9<sup>th</sup> version of Package 1.<sup>2</sup> Packages AC and S have been removed from consideration.

**Table 2 – Summary of effects on commercial fisheries**

	Package 1	Package 2R	Package 3R	Package P	Commission Preferred
<b>Total fishing grounds affected</b>					
Anchovy	4.39%	7.97%	5.79%	5.86%	5.62%
Cabazon	13.27%	16.96%	15.59%	15.34%	14.58%
Dungeness crab	3.38%	7.09%	6.89%	7.24%	6.61%
Deep Nearshore Rockfish	13.02%	16.54%	15.79%	14.35%	14.55%
Halibut	9.08%	10.09%	9.27%	8.85%	8.57%
Kelp Greenling	12.33%	17.73%	16.58%	14.84%	14.92%
Lingcod	12.61%	18.44%	16.95%	15.84%	15.66%
Mackerel	6.66%	12.30%	8.99%	8.98%	8.56%
Rockfish Nearshore	11.92%	15.39%	14.16%	13.95%	13.27%
Rockfish Shelf	5.18%	13.21%	12.72%	7.75%	7.75%
Rockfish Slope	0.64%	1.10%	0.96%	0.96%	0.96%
Rock Crab	4.79%	6.63%	6.21%	6.19%	6.20%
Salmon	0.44%	1.05%	0.79%	0.65%	0.69%
Sardine	4.38%	7.90%	5.76%	5.81%	5.18%
Sablefish	0.86%	2.26%	2.29%	2.45%	2.32%
White seabass	9.47%	7.84%	8.06%	8.51%	7.48%
Surfperch	8.07%	16.77%	18.26%	8.26%	15.78%
Spot Prawn	0.87%	2.50%	2.98%	1.91%	2.04%
Squid	6.82%	10.89%	9.59%	8.75%	7.49%
<b>Fishing grounds within the study area affected</b>					
Anchovy	10.14%	18.41%	13.39%	13.53%	12.94%
Cabazon	15.11%	19.31%	17.78%	17.48%	16.60%
Dungeness crab	6.96%	14.57%	14.13%	14.84%	13.56%
Deep Nearshore Rockfish	14.39%	18.26%	17.45%	15.86%	16.09%
Halibut	11.07%	12.30%	11.32%	10.76%	10.40%
Kelp Greenling	12.74%	18.34%	17.15%	15.37%	15.42%
Lingcod	13.32%	19.53%	17.93%	16.75%	16.55%
Mackerel	9.49%	17.58%	12.86%	12.85%	12.23%
Rockfish Nearshore	13.73%	17.70%	16.26%	16.04%	15.27%
Rockfish Shelf	5.67%	14.48%	13.93%	8.49%	8.49%
Rockfish Slope	14.33%	24.76%	21.66%	21.77%	21.80%
Rock Crab	11.28%	15.59%	14.63%	14.55%	14.56%
Salmon	6.07%	13.83%	10.44%	8.72%	9.32%
Sardine	10.14%	18.41%	13.39%	13.53%	12.06%
Sablefish	8.05%	21.22%	21.51%	23.03%	21.71%
White seabass	11.56%	9.58%	18.26%	10.38%	9.12%
Surfperch	8.07%	16.79%	9.86%	8.28%	15.82%
Spot Prawn	6.49%	18.36%	21.93%	14.04%	15.02%
Squid	9.00%	14.36%	12.63%	11.54%	9.86%

<sup>2</sup> The commercial fishery database was updated to account for a data processing error discovered in the squid fleet in March 2006, resulting in slight changes in the impacts of Package 1 that we report here

<b>Stated importance of total fishing grounds affected</b>					
Anchovy	3.65%	6.96%	5.14%	5.84%	4.92%
Cabazon	14.42%	27.33%	24.56%	18.97%	21.86%
Dungeness crab	1.92%	5.48%	5.59%	6.13%	5.50%
Deep Nearshore Rockfish	15.78%	21.80%	20.40%	19.19%	20.90%
Halibut	5.92%	9.23%	8.22%	6.59%	7.19%
Kelp Greenling	12.95%	23.61%	21.19%	16.99%	18.69%
Lingcod	12.87%	25.14%	22.85%	17.37%	19.47%
Mackerel	4.52%	8.72%	6.98%	8.12%	6.52%
Rockfish Nearshore	13.82%	24.77%	22.93%	18.62%	20.10%
Rockfish Shelf	6.99%	11.86%	11.47%	7.74%	7.74%
Rockfish Slope	0.64%	1.10%	0.96%	0.96%	0.96%
Rock Crab	5.79%	6.41%	6.36%	6.44%	6.50%
Salmon	0.77%	2.31%	1.49%	1.29%	1.41%
Sardine	3.45%	7.30%	5.09%	5.88%	4.47%
Sablefish	0.90%	3.09%	3.13%	3.20%	3.15%
White seabass	8.21%	7.39%	7.64%	7.23%	6.79%
Surfperch	2.73%	5.06%	5.51%	2.49%	4.76%
Spot Prawn	1.97%	4.19%	5.39%	3.34%	3.48%
Squid	5.77%	9.69%	7.26%	6.71%	4.70%
<b>Stated importance of fishing grounds within the study area affected</b>					
Anchovy	5.72%	10.89%	8.06%	9.14%	7.71%
Cabazon	14.64%	27.71%	24.90%	19.27%	22.20%
Dungeness crab	4.50%	12.83%	13.09%	14.31%	12.84%
Deep Nearshore Rockfish	16.49%	22.80%	21.36%	20.12%	21.93%
Halibut	6.44%	10.02%	8.95%	7.16%	7.80%
Kelp Greenling	13.12%	23.92%	21.45%	17.22%	18.92%
Lingcod	13.11%	25.57%	23.24%	17.68%	19.82%
Mackerel	5.36%	10.28%	8.23%	9.61%	7.75%
Rockfish Nearshore	14.30%	25.64%	23.72%	19.31%	20.86%
Rockfish Shelf	7.46%	12.67%	12.24%	8.27%	8.27%
Rockfish Slope	14.33%	24.76%	21.66%	21.77%	21.80%
Rock Crab	11.99%	13.30%	13.17%	13.30%	13.42%
Salmon	3.42%	10.30%	6.65%	5.72%	6.22%
Sardine	5.24%	11.09%	7.71%	8.92%	6.76%
Sablefish	6.83%	23.30%	23.61%	24.19%	23.81%
White seabass	9.11%	8.16%	8.46%	8.01%	7.53%
Surfperch	2.73%	5.06%	5.51%	2.50%	4.78%
Spot Prawn	7.28%	15.48%	19.85%	12.28%	12.82%
Squid	6.17%	10.30%	7.75%	7.17%	5.02%

For example, package 1 has lesser effects (both in area and value) on fisheries such as squid and spot prawn than on, say, White seabass. Illustrating another set of effects, package P affects about 9% of the total fishing grounds for halibut, but close to 11% when considering those that fall into the (nearer to shore) study area waters. In this case, the effects on fishing area and importance are almost identical, with 6.59% and 7.16% of stated importance affected, respectively. In addition, from Table 1, the halibut fishery constitutes a little under 2%

of study area commercial fisheries. In some cases, for example, nearshore rockfish, alternatives can have markedly different effects on area and relative “value”.

Table 3 summarizes the effects on recreational fisheries. The estimated effect on trip numbers is an upper boundary, since a trip may be counted twice in the data when it covered more than one microblock. Furthermore, the analysis assumes that all trips to a block would be lost.

**Table 3 – Summary of effects on private and rental boat recreational fisheries**

	<b>Package 1</b>	<b>Package 2R</b>	<b>Package 3R</b>	<b>Package P</b>	<b>Commission Preferred</b>
<b>Recreational Salmon Area affected statute miles<sup>2</sup></b>	0.05	9.66	5.50	4.41	4.51
<b>Maximum Number of Salmon Trips affected</b>	4	75	66	35	56
<b>Recreational Rockfish Area affected statute miles<sup>2</sup></b>	17.58	43.42	39.15	38.03	38.44
<b>Maximum Number of Rockfish Trips affected</b>	269	472	480	305	365

Results in terms of the percent area of the fishing grounds affected to follow.

#### **Summary of results from the analysis of fisheries effects**

Each package was analyzed for impacts on 19 commercial fisheries and 2 important recreational fisheries (i.e., salmon and rockfish). There are several patterns that emerge from the analysis of the 5 proposed MPA packages (Packages 1, 2R, 3R, P and “Commission Preferred”, excluding Package 0):

- A. All packages affect the 19 commercial fisheries differently, with the smallest effects in terms of both value (as measured as “stated importance”) and area affected evidenced in Package 1 in the majority of fisheries studied.
- B. Averaging across all 19 fisheries, the Commission Preferred Package has average impacts ranging 8.33% and 14.04%; Package P has average impacts ranging between 8.24% and 14.10% on relative values and fishing grounds; Package 1 has impacts between 6.5% and 10.4%; Package 2R has average impacts ranging from 10.1% to 17%; and Package 3R from 9.3% to 14.7%. Across all packages, the maximum impact of any package on a single fishery is 27.7% (impact of package 2R on the Cabezon fishery in terms of the value of fishing grounds affected within the study area), and the minimum impact is 0.4% (impact of package 1 on Salmon fishery in terms of the area of total fishing grounds affected).
- C. The size of the impact varies depending on which of the four impact categories is considered: total fishing grounds, fishing grounds within the study area, value of total fishing grounds, or value of study area fishing grounds. In general, and not surprisingly, impacts are greater when considering study area effects, and smaller when considering the overall fishing grounds.
- D. In the commercial fisheries, Package 2R commonly has the greatest potential impacts and Packages 3R, P, and “Commission Preferred” commonly have potential impacts between Package 1 and Package 2R. Package 3R tends to have impacts closer to

those of Package 2R, and Package P and the Commission Preferred Package closer to Package 1.

- E. There are some deviations from this pattern in terms of the relative value of the affected areas, i.e., larger areas affected do not always correspond to higher stated importance affected.
- F. In the commercial fishery, for 16 out of the 19 species investigated, Package 1 has the least effects on the relative value of total fishing grounds. Package 2R has the greatest potential impacts by this measure on 13 fisheries; Package P and 3R has the greatest potential impact in 2 fisheries; and the Commission Preferred Package has the greatest potential impact on 1 fishery.
- G. The Commission Preferred Package, P, and 1 each have less than 10% impact on the value within the total fishing grounds area for 14 of the 19 commercial fisheries, compared to 13 for Packages 2R and 3R. However, the general pattern of Package 1 having less impact persists.
- H. In general, the Commission Preferred Package shows less impact to coastal pelagic fisheries, including squid than Package P and greater impact to the rockfish, nearshore, crab, and halibut fisheries.
- I. In terms of recreational fisheries, Package 2R has the greatest impacts on recreational fishing areas for both salmon and rock fish, and Package 1 the least.
- J. The Commission Preferred Package, 3R, and P have comparable effects on recreational fishing areas, but P has considerable smaller impacts in terms of trips affected.